※考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

***Questions* [54%]**

Please answer the following questions briefly and justify your answer.

1. **[*16%*]** Strategy and Forecast: (a) What's the focused issues in long-term, intermediate, and short-term production strategy, respective? (b) In your opinion, which one (long-, intermediate, short-) strategy is the most importance? Why? (c) What's the object or item you would like to forecast in long-term, intermediate, and short-term decision, respective? (d) What's the forecasting technique commonly used for each of these time horizons, respective? And Why?

2. **[*18%*]** Aggregate Production Planning (APP) and Master Production Schedule (MPS): (a) What's APP? What's the difference between APP and MPS? (b) What's chase strategy? What's Level strategy? (c) Give a comparison of pros, cons, and applicable condition between chase strategy and level strategy. (d) Is it true that aggregate forecast is more accurate than forecast of the associated individual item? Why? Please justify your answer.

3. **[*20%*]** Production and Lean Manufacturing: (a) Give a comparison of pros, cons, and applicable condition among make-to-stock (MTS), make-to-order (MTO), assemble-to-order (ATO), and make-to-forecast (MTF). (b) Is it true that reducing the batch size can reduce the production lead time? Why? (c) In fact, the small-batch-size production may cause the loss of frequent setup and changeover. When or in what condition you don't suggest small-batch-size production.

***Numerical Problem and Analysis* [46%]**

Please answer the following numerical questions and show all your work "**in detail**".

4. **[*18%*]** Queueing Theory

NCKU hospital gives a diagnosis-and-treatment to patient infected with dengue fever at an average of 14 patients per day (24 hours) following Poisson distribution. The doctor group in NCKU hospital requires an average of 0.5 hour to diagnose and treat one patient with a service time following exponential distribution. Assume there is only one doctor group with working 8 hours per day. The queueing line is infinite.

(a) **[*3%*]** What is the doctor group's mean diagnosis-and-treatment (service) rate per day?

(b) **[*3%*]** What's the probability of the empty NCKU hospital?

(c) **[*3%*]** What's the average number of patients in queue (waiting for service)?

(d) **[*3%*]** What's the average waiting time of patient in queue (waiting for service)?

(e) **[*6%*]** A patient will leave if waiting for 10 minutes, what's the patient arrival rate you suggest?

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5. **[14%]** Newsboy Problem

NCKU souvenir store is celebrating the NCKU 84th anniversary and planning to sell a "special souvenir" with limited quantity in anniversary-week. The selling price is NTD$250 and the cost is NTD$80 for each item. The item, if not sold, can be returned to the supplier who will refund the store NTD$40 for each item (i.e., salvage value). Assume the customer demand follows the normal distribution with mean 400 sets and standard deviation 100 sets.

(a) **[5%]** What's the optimal order quantity to NCKU souvenir store? (see distribution table in **Appendix**)

(b) **[3%]** According to (a), what's the probability of shortage?

(c) **[6%]** If supplier offers a discounted cost NTD$70 per item with order quantity larger than 500, what's the optimal order quantity?

6. **[14%]** Forecast Problem

NCKU fast food store sells hamburger to students. Assume only one identical hamburger. Suppose that the demand history of hamburger for the past eight weeks is given as following table.

Week	Demand (100 units)	Week	Demand (100 units)
1	13	5	21
2	27	6	33
3	39	7	47
4	25	8	31

(a) **[4%]** Use 2-period and 4-period moving average forecasting demand in 9th week, respectively.

(b) **[4%]** In N-period moving average, what's the different effect given a larger number N and a smaller N?

(c) **[6%]** For a linear regression model by ordinary least squares (OLS), does high correlation between independent variable and dependent variable imply cause-effect relation? If no, why? what's other necessary condition of cause-effect relation?

系所組別：製造資訊與系統研究所

考試科目：生產管理

考試日期：0227，節次：2

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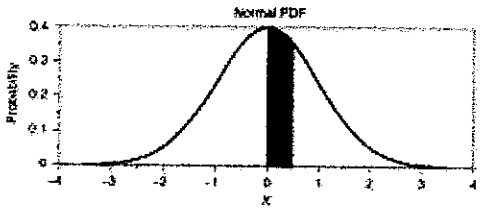
Appendix- Standard Normal Distribution Table



Area under the Normal Curve from 0 to X

X	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.00000	0.00399	0.00798	0.01197	0.01595	0.01994	0.02392	0.02790	0.03188	0.03586
0.1	0.03983	0.04380	0.04776	0.05172	0.05567	0.05962	0.06356	0.06749	0.07142	0.07535
0.2	0.07926	0.08317	0.08706	0.09095	0.09483	0.09871	0.10257	0.10642	0.11026	0.11409
0.3	0.11791	0.12172	0.12552	0.12930	0.13307	0.13683	0.14058	0.14431	0.14803	0.15173
0.4	0.15542	0.15910	0.16276	0.16640	0.17003	0.17364	0.17724	0.18082	0.18439	0.18793
0.5	0.19146	0.19497	0.19847	0.20194	0.20540	0.20884	0.21226	0.21566	0.21904	0.22240
0.6	0.22575	0.22907	0.23237	0.23565	0.23891	0.24215	0.24537	0.24857	0.25175	0.25490
0.7	0.25804	0.26115	0.26424	0.26730	0.27035	0.27337	0.27637	0.27935	0.28230	0.28524
0.8	0.28814	0.29103	0.29389	0.29673	0.29955	0.30234	0.30511	0.30785	0.31057	0.31327
0.9	0.31594	0.31859	0.32121	0.32381	0.32639	0.32894	0.33147	0.33398	0.33646	0.33891
1.0	0.34134	0.34375	0.34614	0.34849	0.35083	0.35314	0.35543	0.35769	0.35993	0.36214
1.1	0.36433	0.36650	0.36864	0.37076	0.37286	0.37493	0.37698	0.37900	0.38100	0.38298
1.2	0.38493	0.38686	0.38877	0.39065	0.39251	0.39435	0.39617	0.39796	0.39973	0.40147
1.3	0.40320	0.40490	0.40658	0.40824	0.40988	0.41149	0.41308	0.41466	0.41621	0.41774
1.4	0.41924	0.42073	0.42220	0.42364	0.42507	0.42647	0.42785	0.42922	0.43056	0.43189
1.5	0.43319	0.43448	0.43574	0.43699	0.43822	0.43943	0.44062	0.44179	0.44295	0.44408
1.6	0.44520	0.44630	0.44738	0.44845	0.44950	0.45053	0.45154	0.45254	0.45352	0.45449
1.7	0.45543	0.45637	0.45728	0.45818	0.45907	0.45994	0.46080	0.46164	0.46246	0.46327
1.8	0.46407	0.46485	0.46562	0.46638	0.46712	0.46784	0.46856	0.46926	0.46995	0.47062
1.9	0.47128	0.47193	0.47257	0.47320	0.47381	0.47441	0.47500	0.47558	0.47615	0.47670
2.0	0.47725	0.47778	0.47831	0.47882	0.47932	0.47982	0.48030	0.48077	0.48124	0.48169
2.1	0.48214	0.48257	0.48300	0.48341	0.48382	0.48422	0.48461	0.48500	0.48537	0.48574
2.2	0.48610	0.48645	0.48679	0.48713	0.48745	0.48778	0.48809	0.48840	0.48870	0.48899
2.3	0.48928	0.48956	0.48983	0.49010	0.49036	0.49061	0.49086	0.49111	0.49134	0.49158
2.4	0.49180	0.49202	0.49224	0.49245	0.49266	0.49286	0.49305	0.49324	0.49343	0.49361
2.5	0.49379	0.49396	0.49413	0.49430	0.49446	0.49461	0.49477	0.49492	0.49506	0.49520
2.6	0.49534	0.49547	0.49560	0.49573	0.49585	0.49598	0.49609	0.49621	0.49632	0.49643
2.7	0.49653	0.49664	0.49674	0.49683	0.49693	0.49702	0.49711	0.49720	0.49728	0.49736
2.8	0.49744	0.49752	0.49760	0.49767	0.49774	0.49781	0.49788	0.49795	0.49801	0.49807
2.9	0.49813	0.49819	0.49825	0.49831	0.49836	0.49841	0.49846	0.49851	0.49856	0.49861
3.0	0.49865	0.49869	0.49874	0.49878	0.49882	0.49886	0.49889	0.49893	0.49896	0.49900
3.1	0.49903	0.49906	0.49910	0.49913	0.49916	0.49918	0.49921	0.49924	0.49926	0.49929
3.2	0.49931	0.49934	0.49936	0.49938	0.49940	0.49942	0.49944	0.49946	0.49948	0.49950
3.3	0.49952	0.49953	0.49955	0.49957	0.49958	0.49960	0.49961	0.49962	0.49964	0.49965
3.4	0.49966	0.49968	0.49969	0.49970	0.49971	0.49972	0.49973	0.49974	0.49975	0.49976
3.5	0.49977	0.49978	0.49978	0.49979	0.49980	0.49981	0.49981	0.49982	0.49983	0.49983
3.6	0.49984	0.49985	0.49985	0.49986	0.49986	0.49987	0.49987	0.49988	0.49988	0.49989
3.7	0.49989	0.49990	0.49990	0.49990	0.49991	0.49991	0.49992	0.49992	0.49992	0.49992
3.8	0.49993	0.49993	0.49993	0.49994	0.49994	0.49994	0.49994	0.49995	0.49995	0.49995
3.9	0.49995	0.49995	0.49996	0.49996	0.49996	0.49996	0.49996	0.49996	0.49997	0.49997
4.0	0.49997	0.49997	0.49997	0.49997	0.49997	0.49997	0.49998	0.49998	0.49998	0.49998